

**PTERIDOBLECHNUM,  
A NEW GENUS OF BLECHNOID FERNS FROM AUSTRALIA**

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When revising the acrostichoid genera *Bolbitis* and *Egenolfia* from the Old World for my thesis, I came across *Acrostichum neglectum* F. M. Bail. This species, which was successively transferred to the genera *Leptochilus* and *Campium*, has the essential characters of a blechnoid fern. On account of the differences found between *A. neglectum* and the other blechnoid ferns, it seems necessary to create a new genus to accommodate it, a point of view shared by Prof. Holttum, who gave me valuable advice for this study.

I am indebted to Mr L. S. Smith of the Botanic Museum and Herbarium, Brisbane, for the loan of the collections of this species, to Mr J. H. Kern, who kindly helped me with the preparation of the English text, and to Prof. van Steenis for supervising the MS.

**PTERIDOBLECHNUM, gen. nov.**

Characteribus blechnoidearum. Genere Blechnum affinis, sed diversa nervis distincte anastomosantibus, receptaculo a lamina patenti, sporis pariete crassa instructis, iis Blechnum fraseri comparabilibus. Nomen e rhachibus petiolisque alatis foliorum fertilium et sterilium deductum.

**Pteridoblechnum neglectum** (F. M. Bail.) Hennipm., *comb. nov.* Basionym: *Acrostichum neglectum* F.M. Bailey, Proc. Linn. Soc. N.S. Wales 5 (1881) 32; Fern World (1881) 73 (not seen); F. v. Mueller, Fragm. 11 (1881) 131; F. M. Bailey, Syn. Queensl. Flora (1883) 722 (not seen); Baker in Hook. Ic. Pl. III, 7 (1887) pl. 1689; F. M. Bailey, Lithograms (1892) pl. 185; Queensl. Flora 6 (1902) 1994. Type: *Bailey s.n.* (K, not seen), Queensland, Cook Distr., Trinity Bay Range, May 1877. From the Queensland herbarium at Brisbane I received material without authentic label, which presumably belongs to the same collection.

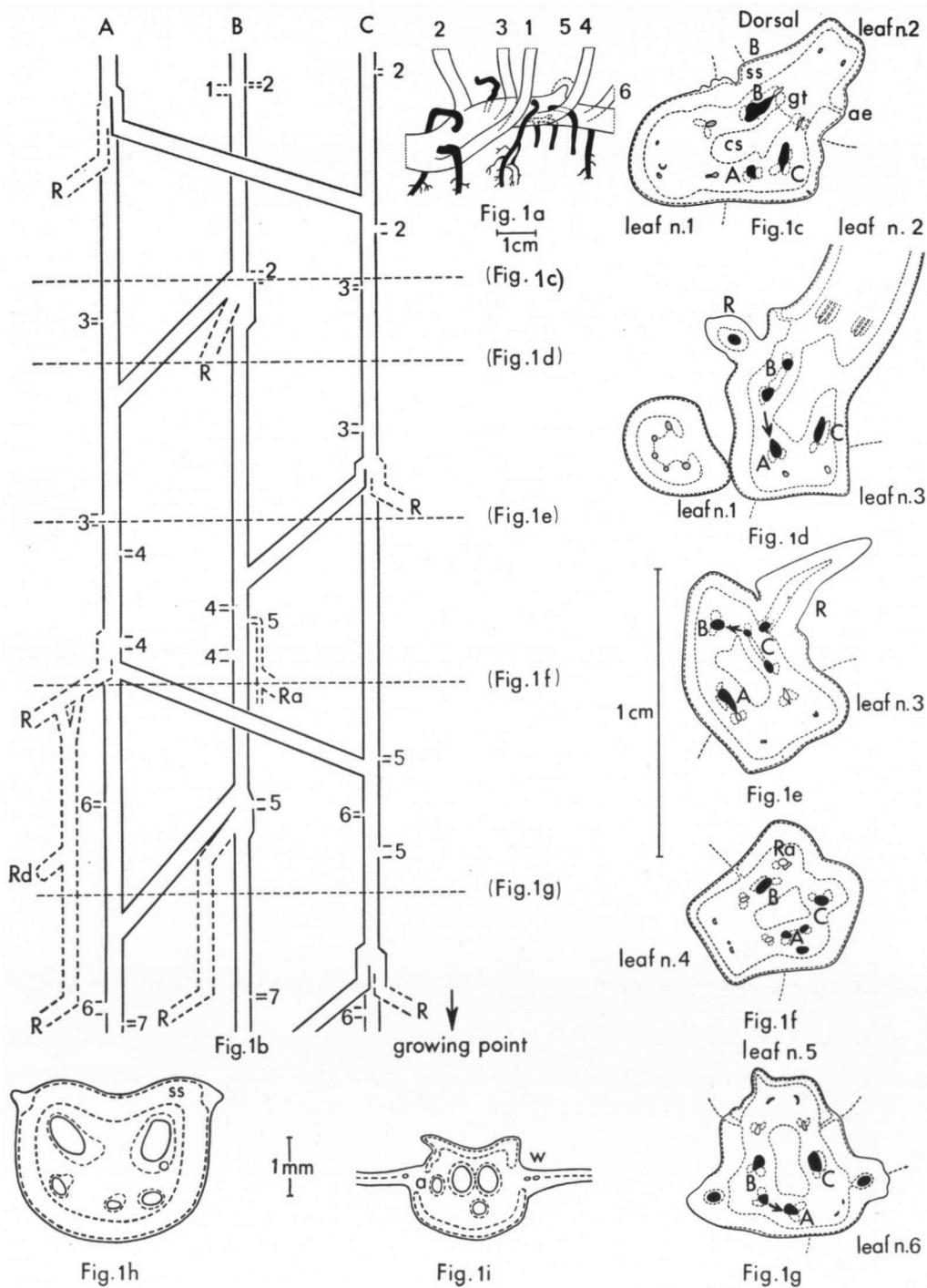
*Leptochilus neglectus* (F. M. Bail.) C. Chr., Ind. Fil. (1906) 15; White and Goy, Vict. Nat. 54 (1938) 150.

*Campium neglectum* (F. M. Bail.) Copel., Philip. J. Sc. 37 (1928) 374.

Terrestrial fern with a long-creeping rhizome, bearing many leaves and roots in an apparently irregular way. Rhizome black, scaly, c. 4—8 mm in diam.

*Vascular anatomy of the rhizome.* Serial sections were made by hand of a piece of the rhizome, 5 cm long, which was cut off 4.5 cm behind the apex (fig. 1a). The material was softened in polyvinylactophenol at 55° C for 24 hours.

The dictyostele is formed by three main, amphiphloic strands from which the branches to the leaves and roots split off. The ways in which these strands communicate and in which branches to the leaves and roots are formed has schematically been drawn in fig. 1b. The three strands are named A, B, and C. The bundles to leaf n. 1 are indicated with number 1, those to leaf n. 2 with number 2, etc. The scheme reveals that vascular bundles for each leaf come down alternately from two of these strands. Each of them gives off branches twice. The anterior bundles are the largest and ultimately become the



two main leaf bundles located on the anterior side of the stipe. The strands A and B give off the branches for the leaves n. 1 and 4, B and C initiate 2 and 5, etc. In the rhizome and at the very leaf base the bundles fuse, divide, and communicate with each other in a rather irregular way.

Drawings made of cross-sections in different places of the rhizome show the thick sheath of sclerenchyma-cells just below the outer cell-layers, together with a central sclerenchymatic core. The main strands and usually also the anterior leaf-bundles are accompanied by groups of dark, thick-walled cells. In the drawings these structures are indicated with dotted lines (fig. 1c—1g).

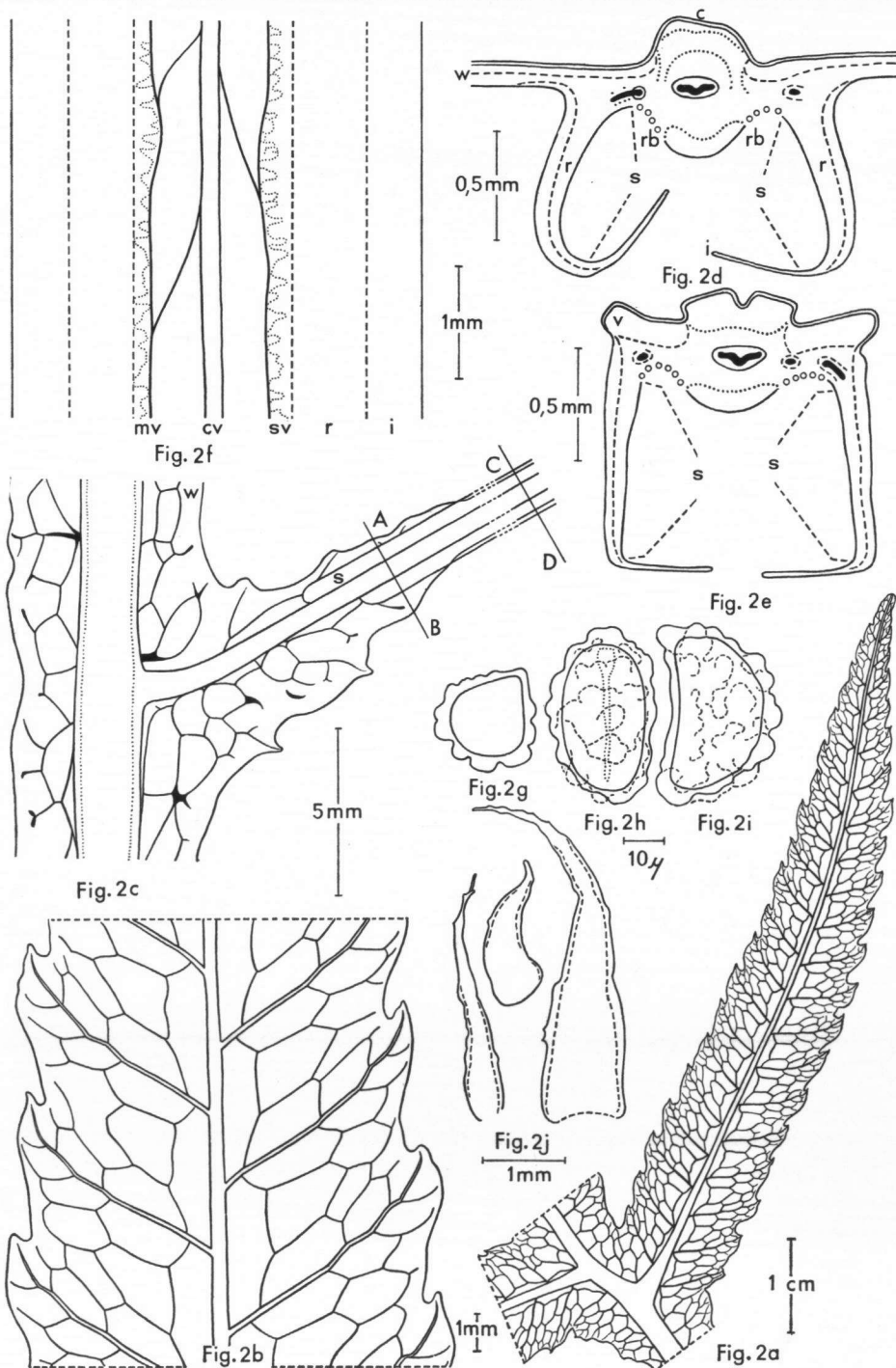
*Vascular anatomy of the leaf.* In a cross-section of the stipe base (fig. 1h), two main anterior veins and 1—4 (usually 3) smaller additional posterior ones can be seen. The central sclerenchymatic core of the rhizome continues but over a small distance into the stipe. Shortly above the rhizome there occurs a torsion of 90° by which the anterior side becomes adaxial. Above the base the petiole becomes grooved on the upper surface. In some petioles small, dark lines of the aerophores can be seen at the stipe base. Usually this is correlated with an interruption in the sclerenchymatic cortex. Higher up the number of vascular bundles diminishes. The abaxial bundles disappear first (fig. 1i).

The vascular bundles of the roots are formed in places where a side branch to another strand is given off. From the point of junction it is sometimes the root which branches off first, sometimes the side branch. The roots are black, 1—1.5 mm in diam., sometimes somewhat swollen near the base, and bear many small, lateral rootlets. In cross-section the diarch stele and a well-developed sclerenchymatic cortex are seen. They leave the rhizome perpendicularly or at an acute angle, sometimes they are appressed against or even adnate to it. It happens that a main root-strand branches several times. Those branches which are formed when the root is adnate to the rhizome, behave as normal roots. The same is true with additional roots which may be formed from secondary branches.

*Sterile leaves.* Petiole with a dentately lobed wing almost to near the base, usually shorter than the lamina, brown, sometimes much darker near the base, 10—35 cm long, possibly also much longer. Lamina ovate, deeply pinnatipartite, \* between two segments on either side of the rhachis with a small wing, more or less suddenly decurrent on the petiole. Rhachis grooved above, yellow in the upper parts, becoming brown at the lower end. Segments 20—50 to the leaf, linear-lanceolate, coarsely serrate, glabrous, smooth, the middle segments 6—15 by 0.7—2 cm. Costae with a small groove which gradually disappears towards the rhachis. Leaves reticulate-veined, without free veins in the areoles (fig. 2a and 2b). Ultimate veinlets ending just before the margin. Margin of the segments formed by 2—5 hyaline, elongated cells with the outer cell-wall more or less protruding. The latter cells larger than the adjacent ones and continuing into the small teeth of the

\* F. v. Mueller in *Fragmenta Phytographiae* II (1881) 131, described the leaves as '... simpliciter vel duplíciter pinnatipartites ...'.

Fig. 1. *Pteridoblechnum neglectum* — a. Piece of the rhizome from which serial sections were made. The leaves are numbered 1, 2, etc. In the dormant leaf bud (n. 5) we find the same pattern of vascular bundles as at the base of full-grown leaves; b. vascular pattern in the rhizome. Only the three main strands were drawn. The lateral bundles bear the numbers of the leaves they run to (R = root bundle, Ra = additional root bundle, Rd = dormant bud of a root branch). Schematic; c—g. cross-sections of the rhizome according to the broken lines in fig. b. The main strands are coloured black. Dermal appendages not drawn (cs = central sclerenchymatic core, ss = sclerenchyma sheath, ae = aerophore, gt = ground tissue); h. cross-sections through the leaf base c. 2 cm above attachment to the rhizome; i. cross-section of the rhachis near the middle of the lamina (w = wing, a = vein to the costa). — From White 19551.



segments. Segments of young sterile leaves strongly circinnate and dark red-brown coloured in dried material.

**Fertile leaves.** Petiole well-developed, winged to almost near the base as in the sterile leaf, usually longer than the lamina, *c.* 30–55 cm long. Lamina of the same shape as in sterile leaves, 20–40 cm long, with linear segments consisting of a costa with two linear, indusiate sori and a vestige of the sterile leaf blade, the middle segments up to 14 cm long. Sori opening on the costal side. The wing along the rhachis continues over a short distance into the segments before becoming very much reduced (fig. 2c).

In a cross-section of the sori at the base of the segments, where a sterile blade is still present (fig. 2d, line A–B in fig. 2c), it appears that they are attached to a receptacle which is more or less perpendicular to the blade and close to the costa. A cross-section halfway the fertile segment reveals that this leaf-like wing becomes very much reduced (fig. 2e, line C–D in fig. 2c). The costal vein is more or less V-shaped. The parallel lateral veins arise under an acute angle from the costal vein. The two marginal veins give off irregular clumps of tracheids in the direction of the receptacle (fig. 2f). The width of the segments varies considerably. Vestige *c.* 1–2 mm, receptacle *c.* 0.7–1.3 mm wide.

The indusium *sensu stricto*, i.e. the receptacle excluded, is membranous, colourless, and one cell thick, *c.* 0.5 mm wide. The edge is entire, in old segments somewhat irregularly lobed, parallel to the costa. When young it is involute and consists of small, cubical cells which lie in more or less distinct rows and are formed by cell division from the marginal cells.

A small zone of red-brown epidermal cells which have thickened upper and lateral cell-walls, lies just along the costa on the lower side. The hyaline stomata sharply contrast with them.

**Sporangia** of the normal leptosporangiate type, with a 14–17-celled, incomplete, vertical annulus, *c.* 175 by 250  $\mu$  (largest width and length). Stalk throughout consisting of three thin or slightly thickened cells, *c.* 0.5–0.6 mm long. Between the basal annulus and the two posterior stalk cells occurs a large hyaline cell. No paraphyses observed.

**Spores** monolet, bean-shaped, with a rather thick, lobed wall, especially on the distal side, on the proximal side thinner, slightly curved in- or outwards and usually with a distinct scar, without a perispore, white, 42–58 by 24–36  $\mu$  (length by largest width of 50 spores of *White 10551*). Fig. 2g–i.

**Dermal appendages.** Rhizome scaly. Scales narrowly triangular, often tapering to an acumen, not clathrate, brown, usually glossy, basally attached, base sometimes auriculate, up to 5 mm long (fig. 2j). Cells of the central part with thickened lateral cell-walls showing many plasmodesmata. Central part of old scales turning black, at least near the base. Upper and lower cell-walls not translucent. Lateral edge membranous, light-brown, with thin cell-walls, entire or somewhat irregularly denticulate.

Scales of the leaves mainly located on the petiole, rhachis, and costae, occurring together with multicellular hairs, very variable in shape and size, either similar to those of the

Fig. 2. *Pteridoblechnum neglectum* — a. Middle segment. Drawing after photographs made by projection photography of a cleared part of the leaf; b. detail of the venation of middle part of a segment; c. abaxial view of part of a fertile leaf showing the continuation of the wing into the segments (s = sorus); d. cross-section of the sori according to line A–B in fig. 2c (w = wing, r = receptacle, i = indusium *s.s.*, rb = red-brown zone along the rhachis); e. *ibid.*, halfway a fertile segment, according to line C–D in fig. 2c (v = vestige of the sterile blade); f. fertile segment when spread out (cv = costal vein, mv = marginal vein, sv = storage tracheids); g–i. spores, optical sections. g. lateral transverse view; h. distal and proximal view; i. lateral longitudinal view; j. rhizome scales. Outside the dotted lines the scales are membranous. — From *White 10551*.

rhizome or intermediate between this type and the multicellular hairs, glossy, with a membranous edge, up to 6 mm long. Central cells of the scales with less thickened lateral cell-walls and of a lighter colour than those of the rhizome.

Young lobes of sterile leaves — young fertile leaves were not available — mainly on the underside covered with two- or three-celled hairs, c. 0.1 mm long and with thin, hyaline cell-walls except the cross-wall which is somewhat firmer and brown. Terminal cell more or less round and in a few cases filled with a presumably glandular substance. Long multicellular hairs with elongated cells and small, hairlike scales are widely scattered between them. In full-grown leaves only remnants of these outgrowths are present.

*Distribution*: N. Queensland. *Specimens examined*: Johnstone River s. coll. (BRI); Kuranda, on north side of Barron River, *Walter s.n.* (BRI); Mt Spurgeon, *White 10551* (BRI, GH); between Cairns and Herberton, *Willd 1891* (BRI).

#### RELATIONSHIPS

F. M. Bailey (1881, 32) mentioned in his description of *Acrostichum neglectum* the resemblance of the rhizome to that of *Lomaria*, and on the other hand the similarity of the venation to that of *Acrostichum repandum* [a synonym of *Bolbitis heteroclita* (Presl) Ching ex C. Chr.]. According to Baker (1887, opp. pl. 1689), it comes nearest to the widespread Indian *A. virens* Wall. [a synonym of *Bolbitis virens* (Wall. ex Hook. et Grev.) Schott]. Copeland (1928, 374), who transferred the species to the genus *Campium*, discussed the opinions of Bailey and Baker. He wrote: 'It differs from either of these [*A. repandum* and *A. virens*] conspicuously enough to make me suspicious as to the genus'. Christensen (1906, 15) transferred it to *Leptochilus*, but in his Supplement III (1934, 119) he wrote: '?neglectus (Bailey) C. Chr. — Genus valde dubium, Blechno affine'.

In my opinion this fern must be placed in the subfamily *Blechnoideae* C. Chr., as defined by Holttum (1947, 143) because of the radial scaly rhizome, the linear indusiate sori, the bilateral spores, and the stipe not articulated with the rhizome, with several vascular bundles.

The small leafy wing along the rachis, which gives the fertile leaf a peculiar appearance, can also be found in some forms of *Woodwardia* and *Blechnum* species. The type of scales also occurs in the genus *Blechnum*, but is unlike that of *Woodwardia*, *Sadleria*, and *Lorinseria* species. The veins in the leaf of *Pteridoblechnum neglectum* strongly anastomose, the complete pattern of the venation is already present in a very young stage. This distinguishes it from both *Blechnum* and *Woodwardia* species, where at least the ultimate veinlets are free and parallel to one another. The venation of *Lorinseria* is not directly comparable as prominent lateral veins do not occur. The species is also characterised by its spores which have a rather thick wall and lack an episporium. Several related ferns, as for instance *Woodwardia radicans*, many *Blechnum*, *Sadleria*, and *Doodia* species usually have thin-walled spores whether or not with an episporium.

However, it appears that the spores of *Blechnum fraseri* (Cunn.) Luerss. are whitish and have a comparable spore-wall. Besides, this *Blechnum* species has other characters in common with *Pteridoblechnum neglectum*: a stem with three main strands which give off leaves and roots in a comparable way, a leaf margin also built up of elongate, hyaline cells, a tendency to form a sterile wing along the rachis of the fertile leaf, a lomarioid sorus, a similar texture of the segments, etc. Copeland (1947, 157) considered this species as 'perhaps the most remarkable' *Blechnum* species. However, all veins in *Blechnum fraseri* are free, the receptaculum is not patent on the sterile blade, and the fertile leaves have bipinnate fronds and no strongly reduced sterile blades.

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